

**State of California
Office of Statewide Health Planning and Development
Division of Facility Development
Structural Engineering Section**

1600 9th Street, Room 420
Sacramento, CA 95814
(916) 654-3362

311 South Spring Street, Suite 1001
Los Angeles, CA 90013
(213) 897-0166

Standard Structural and Anchorage Review Comments
per the 2001 California Building Code

**Applicable to hospital buildings
for projects received after November 1, 2002.
(Revised February 3,2005)**

(1) Marked Plans and Response

The structural and anchorage comments are shown on this set of drawings in red pen or pencil. Each comment should be identified by a number such as S-1, S-2, S-3, etc, and is enclosed in a cloud.

The text of standard structural comments called out on the review set by "2001(1)" etc, can be found in the attached list of standard structural comments.

The comments all refer to California Code of Regulations (CCR) Title 24 Part 1 Section 7-125(b) unless another section of either Title 24 Part 1 or Part 2 is specifically cited.

In order to facilitate the back check, please respond in writing to each comment. Your response may be in the form of a letter or each response may be written on this final review set of drawings near the comment in a color other than red or green. If the responses are presented in a letter, identify the comment by drawing sheet number and the comment number. In both cases, each response should specify how and where on the resubmitted drawings, specifications, or calculations the OSHPD comments have been resolved.

If you have any questions, please do not hesitate to call the Structural Reviewer:

(name)

(phone)

(2) Signature - Structural Engineer

All final structural drawings and specifications shall bear the structural engineer's stamp or seal, signature, and expiration date per California Business and Professions Code, Section 6735 and CCR Title 24 Part 1 Section 7-115(a).

(3) Intent of the Drawings

Due to the difficulty of anticipating every unsatisfactory condition that might exist in connection with the existing work where alteration or reconstruction work is proposed, the following clause or one of similar meaning shall be included on the plans or in the specifications:

The intent of the drawings and specifications is to reconstruct the hospital building in accordance with California Building Standards Code, Title 24, California Code of regulations. Should any condition develop not covered by the approved plans and specifications wherein the finished work will not comply with Title 24, California Code of Regulations, a change order detailing and specifying the required work shall be submitted to and approved by OSHPD before proceeding with the work.

Reference: CCR Title 24, Part 1, Section 7-125(b)(2).

(4) Tests and Inspections

A Testing, Inspection and Observation (TIO) program must be developed (specifying Tests and Special Inspections only), submitted and approved during the plan review process. See Section 7-141, Title 24, Part 1 for requirements. An acceptable TIO form can be down loaded from

http://www.oshpd.state.ca.us/fdd/About_Us/Plan_checking/TIO.htm

OSHPD must approve the TIO program including the individuals and/or firms who will perform the specified tests and/or inspections prior to issuance of a building permit.

(5) Documents for approval

Separate the substantiating documentation from the contract documents to be stamped "Approved" by OSHPD and bind them separately. OSHPD only approves plans and specifications, it does not approve substantiating

documentation such as calculations, cost estimates, manufacturer cut sheets, etc. These substantiating documents should be submitted if they are required for approval of the contract documents but they must not be found on, and should not be bound in the contract documents to be stamped "Approved".

For Post-Approval Documents (PADs), clearly identify the documents to be stamped "Approved" by numbering all of the sheets that comprise changes to the existing OSHPD "Approved" contract documents. Provide a cover sheet with a complete index of the documents to be stamped "Approved". Changes to the existing OSHPD "Approved" contract documents must be identified by clouding them on the plans or identifying them by some other means.

(6) Nonstructural component and equipment anchorage

Provide details on the plans or in the specifications and substantiating calculations (when necessary) for the support and anchorage of nonstructural components and fixed equipment (mechanical, electrical, medical and miscellaneous) if:

- a. The equipment has an operating weight over 400 pounds and is mounted directly on the floor or roof, or:
- b. The equipment has an operating weight over 20 pounds and is suspended from the roof, floor, or wall or is supported by vibration isolation devices.

Fixed equipment is defined as equipment that is permanently attached to the structure. Equipment must be anchored if it is permanently attached to the building utility services such as electricity, gas, or water. For the purposes of this requirement, "permanently attached" shall include all electrical connections except two- and three-prong plugs for duplex receptacles.

The anchorage details must be clearly coordinated with the calculations and the manufacturer's literature. Sketches shown in the calculations for the purpose of illustrating the analytical method are not adequate. OSHPD does not approve calculations; therefore, they cannot appear on the approved plans or specifications.

Equipment installation and anchorage should not proceed without OSHPD approved details on the jobsite.

These details and calculations may not necessarily be the responsibility of the Structural Engineer of Record. (Reference: CCR Title 24, Part 1, Section 7-

125(c)(2)(L), 7-125(c)(4)(M), and 7-125(c)(5)(L)).

(7) Temporary and movable equipment

Temporary and movable equipment may be exempt from anchorage and bracing requirements. Where components are identified as “temporary”, the drawings should indicate the expected duration of use and intended permanent replacement component. Equipment may be considered “movable” if during normal use of the component, it is moved from one location to another. Components mounted on wheels to facilitate periodic maintenance or cleaning but which otherwise remain in the same location are not considered movable for the purposes of anchorage and bracing. See footnote 24 of Table 16A-O for required restraints for mobile storage racks and cabinets.

(8) Design specifications for equipment must specify the design lateral forces that the equipment must resist. Alternatively, the specifications may require that equipment be able to resist the forces required by Section 1632A.3.

(9) Equipment Anchorage Detailing

Show the following note prominently on the plans:

Anchorage of all equipment to be installed, as a part of this project shall be detailed on these plans, except for the following;

- 1. Equipment weighing less than 400 pounds supported directly on the floor or roof.**
- 2. Furniture (except as noted in Table 16A-O).**
- 3. Temporary or movable equipment (except as noted in Table 16A-O).**
- 4. Equipment weighing less than 20 pounds supported by vibration isolators.**
- 5. Equipment weighing less than 20 pounds suspended from a roof or floor or hung from a wall.**

Permanent equipment in items 1, 4, and 5 must be supported and anchored to resist the forces prescribed by Section 1632A and the anchorage shall be approved by the appropriate Design Professional of Record and OSHPD as a part of field reviews/observations. The Inspector of Record shall assure that the above requirements are enforced.

Reference: CBC Title 24 Part 1, Sections 7-125(c)(2)(L), 7-125(c)(3)(C), 7-125(c)(4)(M) and 7-125(c)(5)(L)).

(10) Pipe and Duct Support

Provide calculations and details for the support and bracing of all pipes, ducts, and conduits or show a note on the plans or in the specifications requiring that pipes, ducts, and conduits be installed in accordance with a specific OSHPD pre-approved anchorage and bracing system (the OPA numbers for the acceptable alternatives must be specified on the drawings). See comment 2001(18).

(11) Building Separations

Pipes, ducts, and conduits which cross building separations shall be designed and detailed to accommodate displacements calculated on the basis noted in CBC Section 1633A.2.11. Show the required details on the plans and provide the substantiating calculations, including a longitudinal seismic brace on each side of the building separation where bracing is required by Section 1632A.6.

(12) Equipment Not In Contract (**NIC**)

For all new or relocated equipment to be installed under the scope of this application and designated as "by others" or "not in contract," it is the responsibility of the architect and/or the structural engineer in general responsible charge of the project to sign and submit the necessary drawings, specifications, and design calculations to OSHPD for review and approval. Alternatively, exclude the equipment from the plans and the scope of this application. All equipment thus excluded can be installed only after obtaining the approval of OSHPD under a separate application.

(13) Equipment anchorage approval

Equipment anchorage details must be approved by OSHPD, prior to fabrication and installation. If the equipment has been specified such that anchorage details can be determined, then the details must be shown on the drawings or in the specifications. **No reference to "or equal" is allowed unless it is clearly specified that any "or equal" substitutions must be approved by OSHPD by means of a change order.**

(14) Deferred approval

(REVISED February 3, 2005)

Where the anchorage details cannot yet be determined, then their approval may be deferred if all of the following conditions are met:

- 1) The anchorage cannot be fully detailed on the approved drawings or specifications because of variations in product design or manufacture; e.g., the manufacturer has not yet been chosen, or specified equipment is for performance criteria only.
- 2) All items requiring deferred approval are listed under a separate heading on the drawings, preferably on the title sheet, and on a letter size sheet that will be attached to the building permit. This list must include the maximum weight of the equipment for which the supporting structure was designed. **Clearly indicate that OSHPD approval of the deferred portion is required prior to fabrication and/or installation.**
- 3) The drawings and specifications must fully describe the performance and loading criteria for such work. The design of the supporting building structure cannot be deferred; therefore, show the maximum allowable equipment weight on the drawings. When the equipment is chosen, comparing the actual equipment weight to the maximum allowable equipment weight shown on the plans can substantiate the adequacy of the supporting structure.
- 4) The architect and/or engineer responsible for preparation of drawings and specifications for the main project, as listed on the applications, shall review and forward the drawings and specifications for the deferred approval items to OSHPD with the appropriate application form.
- 5) Anchorage details and calculations must be submitted sufficiently in advance of the desired date of approval to provide time for the initial review by OSHPD and at least one cycle of response and back check review.

(15) Anchorage pre-approval

Where contract drawings reference Anchorage Pre-Approval Numbers (OPA-xxxx) for specific pieces of equipment, the consultant shall verify that the pre-approval is appropriate. If the installation varies in any way from that shown in the Anchorage Pre-Approval document, provide complete calculations for

anchorage and bracing of the component and system.

A copy of the chosen bracing system(s) installation guide/manual shall be on the jobsite prior to starting the installation of the component, equipment, hangers and/or braces.

(16) Pre-approved components and systems “OPA” numbers

Pre-approved nonstructural components installed under the 2001 CBC must have a valid OPA number. Pre-approvals beginning with an “R” (R-numbers) are not valid for use with the 2001 CBC.

(17) Pre-approved component and system limitations

Some pre-approvals have limitations that require either a deferred submittal (see comment 2001(14)) of layout drawings and component design or a pre-engineered design that is a part of the contract documents. All of the listed systems require that the seismic lateral force, F_p , including consideration of a_p and R_p , be determined at each level of the building so that brace spacing and anchorage requirements can be determined. The District Structural Engineer may approve the seismic lateral force computations.

(18) Pre-approved pipe, duct, and conduit bracing

Plans are required showing how and where the pre-approved anchorage and bracing systems will be applied to each applicable system on the project. Depending on the system to be anchored and/or braced, these plans may be prepared by an architect or engineer. These drawings will be used by the IOR to verify correct installation of the bracing system (CBC Part 1, Section 7-115).

Once the exact locations of all pipes, ducts and conduits have been established, the structural engineer of record must verify the adequacy of the supporting structure for loads imposed by the anchorage and bracing system, to ensure that the original design is still adequate. The structural engineer of record must review and forward the anchorage and bracing plans to OSHPD with a notation indicating that the plans have been reviewed and are in general conformance with the design of the project (CBC Part 1, Section 7-153(d)). A “shop drawing stamp” may be used to indicate compliance with this requirement. For some pre-approved systems, the drawings are deferred approval item requiring formal review and approval (see comment 2001(13)).

(19) Fire Sprinklers

Show a note on the plans or in the specifications requiring that the spacing and details of the support and bracing of fire sprinkler piping comply with the 1999 edition of NFPA 13 and Chapter 35 of the 2001 CBC (SFM Amendments).

Provide anchorage details and calculations for the connection of sway bracing to the structure. Design loads for the design of the sway bracing and anchorages shall be computed per Section 1632A of the 2001 CBC and Section 6-4.5.6 of NFPA 13. Where applicable, details for the support and bracing may be referred to an OSHPD pre-approved anchorage system. All shop drawings of the sprinkler system shall be submitted to OSHPD for review and approval prior to installation. The allowable values for anchors in Figure 6-4.5.9 of NFPA 13 shall not be used. Refer to the adopted CBC standards for allowable loads on the specific fastener type.

(20) Vibration Isolators

For all vibration isolators and their anchorage, provide calculations, details, and/or test data to substantiate the isolator's capacity for vertical and lateral loads or use OSHPD pre-approved isolators. Calculations must also be submitted (whether preapproved or not) to substantiate the size, quantity, location and connection to the structure of the isolator. The drawings must be closely coordinated with the calculations and clearly specify the manufacturer, model type, model number, base plate size, quantity used and location at each piece of equipment, and how it is attached to the structure. Isolators in internally isolated components are not reviewed. However, for the purposes of determining a_p , internally isolated equipment shall be considered "flexible". Additional requirements are contained in Footnotes 14 and 16 to Table 16A-O.

(21) Kitchen equipment

Provide calculations and details for the support and anchorage of all kitchen equipment that is to be permanently fastened to the building or utilities.

(22) Grab bars

Show on the plans details of how grab bars and/or tub and shower seats, located in handicapped toilets and shower stalls, are connected to the supporting structure. See Section 1115B.8.3, 2001 CBC for required strength.

(23) Television and monitor brackets

The design of wall or ceiling mounted television and monitor brackets shall comply with the CBC Title 24 Part 2 Section 1632A. The design shall include: 1) The connection of the bracket to the structure; 2) The supporting structure; and 3) The bracket itself. Substantiation by laboratory testing is also acceptable. The test loads, methods, and procedures should be approved by OSHPD prior to testing so that possible re-testing will not be required. An acceptable test method is provided in AC 156 published by ICC.

(24) J and L-bolts

The design methods of Section 1923A shall not be applied to J- and L-bolts. Capacities for these bolts may be found in Table 19A-D. Note that J- and L-bolts may not be used to resist seismic forces, except as noted in Table 19A-D, footnote 1.

(25) Post Installed Anchors

For all concrete and masonry expansion or adhesive type (post installed) anchors used, show on the plans or in the specifications the manufacturer, type, diameter, minimum embedment, concrete type(s) and strength(s). Indicate edge distance and anchor spacing. Reduce anchor capacities due to edge distance and spacing as recommended in the anchor Evaluation Report. Code Application Notice (CAN) 1923A.3.5 may be used for guidance in determining allowable shear, tension and test loads. Show the actual magnitudes of the test loads on the contract documents. Testing is required per CBC Title 24 Part 2 Section 1923A.3.5. A copy of the CAN may be obtained from:

http://www.oshpd.state.ca.us/fdd/About_Us/Organization/Regulations/CANS/Index-c.pdf

(26) Installation of Post Installed Anchors

Show or reference the following note prominently on the plans (non-applicable portion may be excluded):

When installing drilled-in anchors and/or powder driven pins in existing non-prestressed reinforced concrete, use care and caution to avoid cutting or damaging the existing reinforcing bars. When installing them into existing prestressed concrete (pre- or post-tensioned) locate the prestressed tendons by using a non-

destructive method prior to installation. Exercise extreme care and caution to avoid cutting or damaging the tendons during installation. Maintain a minimum clearance of one inch between the reinforcement and the drilled-in anchor and/or pin.

(27) Incomplete Submittals

The following comments are based on a preliminary or incomplete submittal. A more thorough review will be made upon resubmittal and additional comments will follow.